

The Greatest Debate in History

Is there another, more perfect world out there - or is this imperfect reality all we have?

by Karl Giberson

[Printer Friendly Version](#)

All of western philosophy is nothing but a series of footnotes to Plato. Those were the words of Alfred North Whitehead, one of the great thinkers of the twentieth century.

He was right. Plato's presence is felt everywhere: in our language, where a deep relationship free from sex is called *platonic*; our schools, which are called *academies* because Plato set up Europe's first "university" in a part of Athens called the Academy; and of course in math, where today, for instance, we study *platonic* solids and spheres.

Plato claimed we cannot understand the physical world by itself. To comprehend the rich complexity of our world we must accept the reality of another very different world—a nonphysical, unchanging, timeless, eternal realm he called the world of *forms*.

Forms are eternal patterns or blueprints that give order and structure to this world. Plato's inspiration for forms came from mathematician Pythagoras, one of the first thinkers to speculate about the deep nature of mathematics and its relationship to the world. Pythagoras discovered, for example, that music was mathematical: The tuning of Greek musical instruments revealed very simple numerical ratios. He was also intrigued by the way numbers related to shapes, how you could make a triangle with 1, 3, 6, 10 dots; or a square with 1, 4, 9, 16 dots, and so on. Today, when we speak of squaring a number, we pay homage to Pythagoras's ancient conviction that numbers and shapes are related.

Plato's view raises a fascinating question: Does this imperfect world exist on its own, or does it map a more perfect world of archetypes? Mathematicians throughout history have spoken passionately of their work as the *discovery* of truths, rather than their own invention. But where were these truths, prior to their discovery? Long before there were any actual triangles or even any people to think about triangles, triangles and their properties existed. Mathematicians have a deeply rooted intuition that the truths of mathematics are eternal and unchanging and their "existence" is not rooted in the physical world; these truths reside in some other world, where they have always been and where they will be when there are no longer mathematicians to ponder them.

Inspired by this idea, Plato began to wonder what other eternal truths might be out there in this world of the forms. What about eternal truths related to beauty, ethics, politics? Were they also waiting to be discovered? Perhaps our often imperfect definitions of beauty and concepts of right and wrong were based on truths from the world of forms, just as our real-world triangles were based on their perfect counterparts in an eternal and unchanging world.

Virtually every philosopher and physicist from Plato to Einstein down to Penrose has grappled with these ideas. They were front-and-center in an extraordinary exchange between Penrose and physicist Stephen Hawking in the mid-90s at the University of Cambridge. Penrose and Hawking, as leading mathematical physicists, have a broad range of topics on which they fully agree. A notable exception is what happens when particles fall into black holes; Hawking believes they are sort of "gobbled up" but Penrose thinks that their information is preserved. The arguments on both sides of this esoteric question straddle the boundary that separates physical theories from the great cloud of unknowing. And it is in that great cloud of unknowing that the relevance of Plato becomes apparent.

Hawking identifies himself as a positivist; he is quite content to suppose that there is no mathematical world out there. "I don't demand that a theory correspond to reality because I don't know what it is" he says. A theory need only "predict the results of experiments." A perfect triangle need not exist anywhere; it simply needs to help us predict what real triangles will be like.

Penrose responded that as a Platonist, he was very much a realist as well. Penrose shares with Einstein the deep intuition that there is some sort of real world out there that we are measuring. Hawking, says Penrose, has put on the mantle of physicist Neils Bohr, a man who argued that there is no real world out there; there are only the results of our measurements.

The Hawking-Penrose exchange echoed one of the most sustained and celebrated intellectual contests in history—the long debate between Danish physicist Neils Bohr and Albert Einstein over the proper interpretation of quantum mechanics, the most extraordinary intellectual achievement of the twentieth century.

Einstein entered the twentieth century firmly convinced that there was a platonic realm where his mathematical insights lived and breathed. Our physical theories, he argued, are models of that world. When we measure something, we are in fact measuring some thing.

“Not so,” said Bohr, the greatest of Danes. When we measure something we are forcing an undetermined, undefined world to assume some experimental value. We are not “measuring” the world, we are creating it.

The Bohr-Einstein debate went on for decades. Einstein showed up at now-legendary European conferences with ingenious ideas that would support the idea of a real world out there. Without fail, Bohr shot down all of Einstein’s arguments. But, although Bohr gradually won the allegiance of the physics community, he never convinced Einstein, who died in 1955 still believing that there must be a real world out there somewhere.

The long line of deep thinkers that runs all the way back to Pythagoras and Plato, across two millennia, continues today. Perhaps Roger Penrose, Plato’s greatest living champion, will be remembered as much for his brilliant physics as his unwavering conviction that there is much more to this world than meets the eye.